

## Lewis Bay Subwatershed

### Yarmouth and Barnstable, Cape Cod, Massachusetts

Lewis Bay Subwatershed is located in Yarmouth and Barnstable. It has an area of 7,414 acres. It incorporates the Village of Hyannis in Barnstable and the neighborhoods of Hyannis Park, Mill Hill, Colonial Acres, and the Englewood sections of Yarmouth.

Lewis Bay, a shallow bowl with an average depth of about seven feet, together with adjacent Hyannis Harbor located just to the west, is the busiest port system on Cape Cod. The bay is heavily used by pleasure craft, a fishing fleet, and two major boatline operations. Hyannis Inner Harbor has long been the point of embarkation and return for tourists traveling to the Islands of Nantucket and Martha's Vineyard. Most of the commercial vessel traffic comes from the Barnstable side of the bay and includes some very large freight and ferry vessels that have been identified as a major source of traffic congestion for the Village of Hyannis. This activity in Hyannis Harbor lies at the head of the Bay to the west. Kalmus Park, a public beach that juts out into the bay, protects the bay from southerly storms over Nantucket Sound. On the east side of the bay is 6,000 acre Great Island, which juts southwest into Nantucket Sound.

Most of the housing directly on Lewis Bay is located in the Town of Yarmouth, and was developed largely between 1950 and 1990. The development of the bay in Yarmouth created a very high concentration of residential lots all along the shores from the base of Great Island to the base of Kalmus Park. The Route 28 business corridor extends across this watershed. It is located less than a mile from the northerly shore of the bay and there are a vast number of high density motel-resort developments all along this popular artery of the central Cape. Intense residential development characterizes the area to the south of Route 28. There is some industrial development near Exit 7 of the Mid Cape Highway.

Though most of this subwatershed is intensely developed, some land is protected as open space or with conservation restrictions. To the south of Route 28, there is very little open space except for the Cape Cod Hospital cranberry bog property just east of the hospital complex. The hospital property consists of long-inactive cranberry bogs and adjacent uplands. About 40 percent of the area north of Route 28 is open space – mainly in large tracts of water, conservation, and school land with a golf course in the northeastern corner. Residences account for most of the remaining area, including several multi-family units, particularly near the western edge of town. Great Island is a gated community and is characterized by very large houses on huge lots with abundant open space. About 40 percent of it is under conservation restriction (not held by Yarmouth Conservation Trust). Yarmouth Conservation Trust holds a conservation restriction on 54 acres of the 95 acre hospital property and owns seven small properties, mainly building lots, in this subwatershed.

Lewis Bay is showing signs of stress. Water clarity tests conducted by The Conservation Consortium Foundation found that the waters of Lewis Bay are relatively clear, but the bottom conditions are in crisis. The meadows of eelgrass have been replaced by codium and red, brown, and green algae, which points to non-point source nutrient loading. Bay scallops that once were plentiful in the bay have severely declined. While the harvest in 1994 was 1,600 bushels, in 1998 it was 80 bushels. Eel grass beds which protect shellfish seed and juvenile fish have also undergone a sharp decline. The loss of eelgrass is attributed in part to nutrient loading from non-point source pollution from coastal communities and road runoff, and turbidity caused by sediment stirred up by vessel traffic in the bay.

The Massachusetts Division of Marine Fisheries conducted a Sanitary Survey of the shoreline of Lewis Bay. November 2001. The survey identified 18 locations in Barnstable and 86 locations in Yarmouth where there is evidence of stormwater discharge or road runoff into the bay. The bay shows signs of

being impacted by runoff.

The Acid Rain Monitoring Project by the University of Massachusetts-Amherst in 2001 sampled Big Sandy and Horse Ponds. The Acid Neutralizing Capacity (ANC) of Big Sandy Pond was in the “critical” range, meaning that the natural environment may be unable to buffer acid deposition enough to prevent a drop in the pond’s pH. The ANC of Horse Pond was found to be “acidified,” the least healthy classification.

Once seasonal homes on small lots along the Route 28 business corridor are now being occupied year-round, and because the water table is shallow in many areas, replacement of old waste disposal systems may be difficult and expensive. Because of this, the Town of Yarmouth is considering a feasibility study for sewerage Route 28 and some residential areas, particularly Hyannis Park in the southwest corner of town. Currently, there are no public sewers in the Town of Yarmouth.

Most of the developments in the Yarmouth portion of the subwatershed are served by on site septic systems as their means of sanitary wastewater treatment. These include the motel-resort developments along the northern shore of the bay and 2,500 residential dwellings that are within half a mile of the bay on the Yarmouth side. Some areas of the Barnstable coastline have been sewerage along with the inner harbor, but the zone of contribution extends far inland and there are over 6,000 homes and businesses that contribute to the groundwater nutrient loading that flows to the bay. The distance to groundwater in extreme cases throughout the area is three to four feet directly along the bay to less than 20 feet along the Route 28 corridor.

The Conservation Consortium is beginning to plan the Mill Creek Watershed Project with the goal of mitigating non-point source pollution throughout the Mill Creek and Lewis Bay watershed area. The group is looking wastewater treatment alternatives to reduce nitrogen impacts on the Bay.

A Yarmouth-Dennis septage treatment plant with a capacity of 22 million gallons/year is currently handling 17-18 million gallons/year from all over Cape Cod. The Hyannis Water Pollution Control Facility is designed to treat 4.2 million gallons of sewage per day.

Municipal water is available in almost all parts of Yarmouth. In 2001, the Yarmouth Water Department was installing 10 water services a week, which is a large rate of growth. Town water is supplied to most Barnstable residents through five separate water districts throughout the entire town.

### Stewards:

- Yarmouth Conservation Trust
- Lewis Bay Coalition
- The Conservation Consortium

### Studies conducted in the watershed:

- Massachusetts Division of Marine Fisheries Sanitary Survey of the shoreline of Lewis Bay. November 2001.
- Draft Environmental Impact Report was required in August 2000 for additions to the Barnstable Municipal Airport.
- Cape Cod Nutrient Loading Study – Lewis Bay. Conducted by Tetra Tech. Study will develop critical nitrogen loads, conduct a flushing analysis, and develop watershed nitrogen management options to reduce nitrogen loads. Estimated completion in 2002.
- Acid Rain Monitoring Project by the University of Massachusetts-Amherst, 2001 included Big Sandy and Horse Ponds.
- Water clarity tests conducted by The Conservation Consortium Foundation on Lewis Bay.
- Hyannis Ponds Biohydrology Project, 1995. The Nature Conservancy. Final Report – Phase II completed September 1998 by R. McHorney.
- Cape Cod Atlas of Tidally Restricted Salt Marshes. 2001. Cape Cod Commission.

### Who is collecting water quality data and where?

- Town of Barnstable Department of Public Works and The Conservation Consortium conduct bi-weekly sampling from April to October at two or three depths depending on total water depth.
- Physical – total depth, Secchi depth, temperature, oxygen content, salinity, waterbody state (a subjective observation of general conditions), weather, wind speed and direction.
- Laboratory analyses – nitrate and nitrite, ammonium, dissolved organic nitrogen, chlorophyll, orthophosphate
- The Conservation Consortium has done limited sampling and Secchi work on Little Sandy Pond at the head of the Mill Creek Watershed to Lewis Bay.
- The Town of Yarmouth conducted water quality monitoring at Mill Creek between March and November 2002 (funded by an EOE volunteer water quality monitoring grant) for: Total nitrogen, dissolved inorganic nitrogen, dissolved organic nitrogen, total phosphorus, chlorophyll *a*, salinity, temperature, dissolved oxygen, secchi depth, and benthic macrophytes biomass.

### Management actions taken:

- Town of Yarmouth is looking to assess storm drains within the subwatershed as part of EPA Phase II.
- Town of Yarmouth is currently developing a Waterways Management Plan for fresh and marine waters throughout the town (2002).
- Hyannis Inner Harbor Stormwater Mitigation Assessment Project. Funded by MA Coastal Zone Management's Coastal Pollutant Remediation Grant Program, FY02.
- Town of Barnstable is mapping and assessing storm drains discharging into Lewis Bay as part of the EPA NPDES Permit for Stormwater Phase II.
- Town of Barnstable is participating in the DEP Estuaries Project, a comprehensive evaluation of embayments in Southeastern Massachusetts that uses citizen water quality monitoring and water quality modeling of the embayments to evaluate nitrogen removal strategies in the embayment watershed. \$88,000.
- Town of Barnstable received a FY03 Coastal Pollution Remediation-4 the Environment Grant for its Hyannis Inner Harbor Project.

### Subwatershed facts: (For data sources see Appendix)

- Solid waste sites: none
- Zone IIs located in this watershed: more than 2
- Interim Wellhead Protection Areas (IWPAs): none
- Percent of the undeveloped land that is protected (according to 1985/1990 data): 49.9%
- Certified vernal pools: none
- Named freshwater ponds: Crow, Horse, Big Sandy, West Sandy, Jabez Neds, Mill (*Yarmouth*), Israel, Little Israel, Campground, Lamson, Mary Dunn, Flint Rock, Fresh (*Barnstable*)
- Named rivers or creeks: Town Brook, Thornton Brook, Mill Creek, Hawes Run (*Yarmouth*), Snow's Creek (*Barnstable*).
- 1998 Massachusetts 303(d) List of Impaired Waterbodies: Lewis Bay – pathogens.
- Shellfish growing areas: Hyannis Inner Harbor and Mill Creek are prohibited to shellfish harvesting. The outer section of Hyannis Inner Harbor, an area just south of this, and a portion of the coastline near Colonial Acres are conditionally approved. The rest of Lewis Bay is approved.

- Beach Closings: Kalmus, Bay View, and Colonial Acres (14 closings) Beaches were each closed to swimming for at least one day during the 2001 season due to high enterococcus bacteria counts.
- This watershed contains Natural Heritage and Endangered Species Program (NHESP) Estimated Habitats of Rare Wildlife.
- The towns of Yarmouth and Barnstable are required to comply with EPA's Stormwater Phase II Final Rule.

### Priorities:

- Expand the Town of Yarmouth's Waterways Management Plan to include water quality monitoring for nutrients.
- The Towns of Barnstable and Yarmouth should refer to the DMF Sanitary Survey of the Lewis Bay shoreline (November 2001) to identify priority sites for stormwater remediation.
- Implement BMP for storm drain on Route 28 that discharges directly into Mill Creek. Work with the Massachusetts Highway Department. (NRCS)
- Dredge a portion of Stewart's Creek to remove organic silts and reduce offensive odors and install a box culvert under Ocean Avenue to increase flushing.
- Little Israel, Israel, Mary Dunn, Lampson, Horse, and Big Sandy Ponds need volunteers to participate in the Pond and Lakes Stewardship Project (PALS), measuring water quality and other characteristics of the ponds.
- Address wastewater management in the areas of Hyannis Park and Camp Street to Willow Street in West Yarmouth.
- Implement those salt marsh restoration projects identified in the 2001 *Cape Cod Atlas of Tidally Restricted Salt Marshes* that have been evaluated and prioritized by the town. Sites include: Hawes Avenue restriction of unnamed creek (BA-18), Ocean Street restriction of Snows Creek (BA-19), Bayview Street restriction of unnamed channel into salt pond (YA-5), Park Avenue restriction of unnamed creek (YA-6), Shore Road restriction of an unnamed channel) Connecticut Avenue (YA-7), and Lewis Bay Road restriction of unnamed creek (YA-8). Just west of this subwatershed lies the Ocean Avenue restriction of Stewart's Creek (Site BA-17).
- Acquire open space. Parcels considered a priority for acquisition for water supply development and protection: Yarmouth Tracts 1, 8, 9, 12, 14, and 20 were ranked as having medium or high water supply development potential in the Cape Cod Commission's *Priority Land Acquisition Assessment Project* (April 1999). These tracts are located throughout the town of Yarmouth.

### Recreation:

Camping areas: none

Golf courses:

- Bayberry Hills Golf Course

Pathways and trails:

- [www.capecodcommission.org/pathways/trailguide.htm](http://www.capecodcommission.org/pathways/trailguide.htm)

Public access:

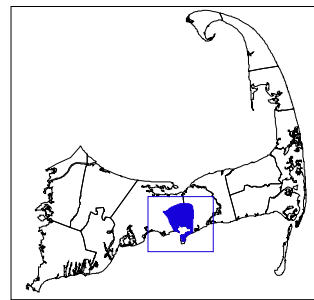
- [www.state.ma.us/dfwele/pab/pabSEmap.htm](http://www.state.ma.us/dfwele/pab/pabSEmap.htm)

Public beaches and landings:

- Sandy Pond Beach, Kalmus Beach, Veterans Memorial, Bay View Beach, Hyannis Park, Colonial Acres Beach, Englewood Beach

# Lewis Bay

Yarmouth and Barnstable, MA



## Watershed Resources



0 0.5 1 1.5 Miles

### Natural Heritage and Endangered Species Program Data

- Certified Vernal Pool
- Priority Habitats of Rare Species
- Estimated Habitats of Rare Species

### Groundwater Protection Areas

- Interim Wellhead Protection Area
- Zone II
- Solid Waste Facility

Watershed Boundary

Anadromous Fish Run

### Shellfish Growing Areas

- APPROVED
- CONDITIONALLY APPROVED
- MANAGEMENT CLOSURE
- PROHIBITED
- RESTRICTED

Open Space

Streams

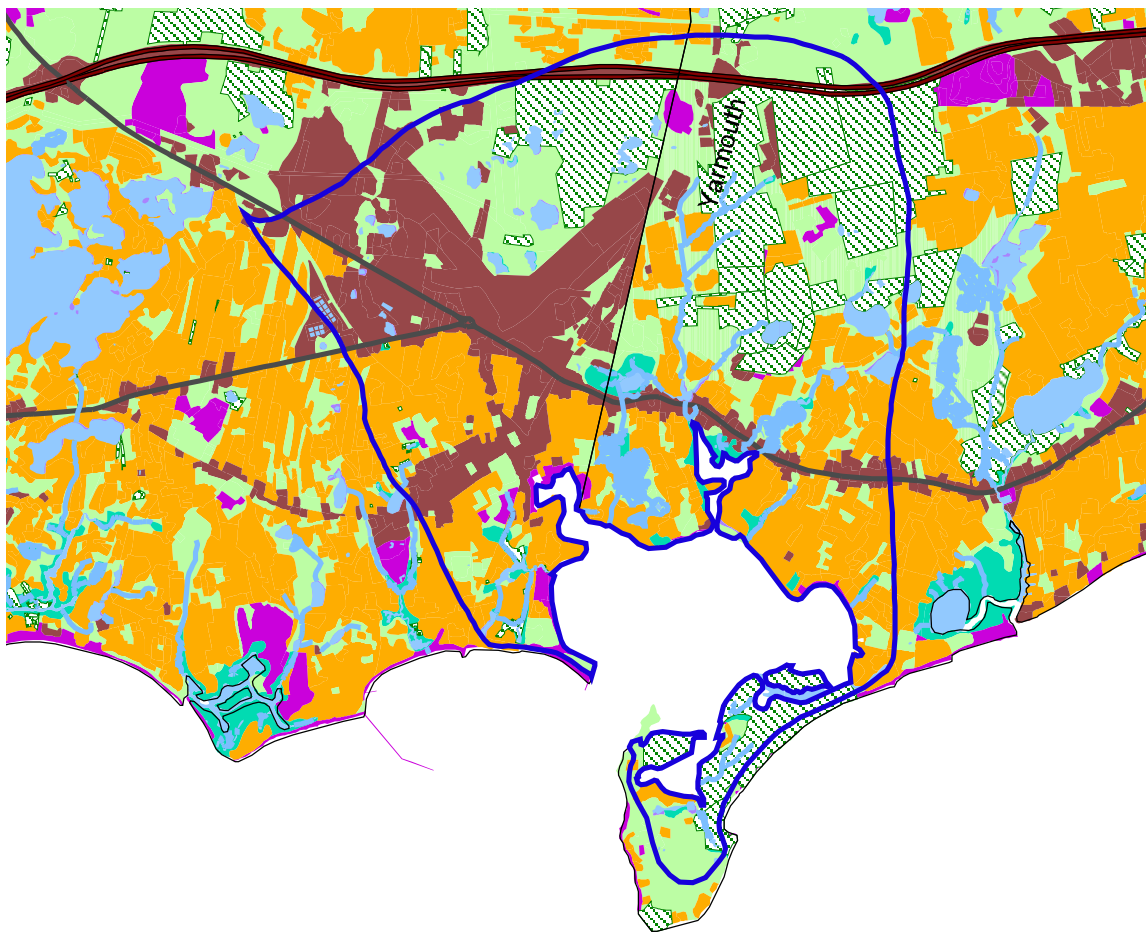
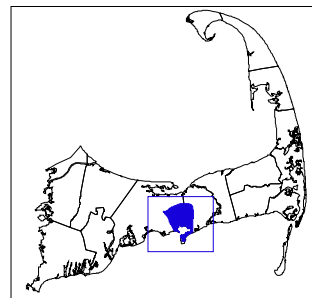
Ponds

Roads

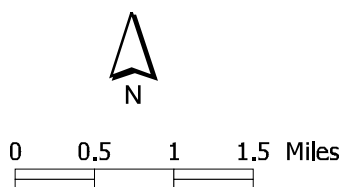


# Lewis Bay

Yarmouth and Barnstable, MA



## Land Use



## Land Use

